Regional Planning and Prioritization of Northern Bobwhite Habitat Restoration in the Southeastern Coastal Plain Bird Conservation Region

a collaborative effort

Forest and Wildlife Research Center, Mississippi State University

Mississippi Department of Wildlife, Fisheries and Parks

Southeast Quail Study Group

Northern bobwhite populations have declined throughout their range at nearly three percent per year since 1966. Although these declines have been attributed to a variety of factors, the most likely cause has been large-scale deterioration of quail habitat quality associated with advanced natural succession, intensive monoculture farming, and intensive timber management. In the Southeast, Midwest and Central regions of the United States, northern bobwhites are linked to early successional plant communities maintained by disturbance (e.g. fire). Early successional plants are the grasses and annual weeds that occur within the first one to three years following disturbance. Stemming the population decline and restoring bobwhite populations to former densities will require creation and maintenance of essential habitat on a massive scale. In the past, bobwhite were an accidental by-product of broadly applied land management practices. In modern landscapes, comparable densities will only exist as a result of premeditated, intentional creation and maintenance of early successional plant communities.

Distribution of Conservation Efforts

The Northern Bobwhite Conservation Initiative defines explicit habitat enhancement or creation objectives for each land-use category within each Bird Conservation Region. However, the recommendations are not spatially explicit in the sense that no recommendations are made as to how habitat management practices should be distributed within the Bird Conservation Region or among patches of a specific land-use category across the region.

A fundamental question of concern for all large-scale conservation initiatives is: "How do we distribute technical expertise, cost-shared practices, and other resources in a manner that optimizes conservation benefit per investment ratios?" Conservation investments should be placed within the landscape in regions that have potential for greatest population response and highest probability of eliciting a sustained response. Such regions might be characterized as already sustaining bird populations, yet having extensive quantities of potentially usable habitat available for enhancement. Tracts large in size and in close proximity to existing suitable habitat should receive priority status. Previous state-level bobwhite initiatives have selectively allocated resources using a variety of subjective and objective criteria to maximize return on investment. In this project, a large-scale habitat modeling approach was used to classify suitable habitat for the purpose of identifying focal areas and guiding habitat enhancement efforts and conservation investments.

Bobwhite Habitat Model

Bobwhite habitat suitability was modeled as a function of landscape structure and composition in a logistic regression context. Bobwhite counts from Breeding Bird Survey routes (n = 121, 1990-1994) were used as a measure of bobwhite abundance and were linked to landscape structure and composition estimated from the 1992 National Land Cover Data.

A model selection process was used to identify the best approximating model from a set of competing candidate models that predicted probability of occupancy as a function of metrics describing landscape structure and composition. The "best" model included the landscape structure and composition measures: 1) percentage of landscape in cropland (measures the proportional abundance of cropland patches in the landscape); 2) percentage of landscape with grassland core area (percentage of grassland habitats minus 100 meters of edge around grassland habitats); and 3) hardwood interspersion-juxtaposition index (index of the interspersion or intermixing of hardwood patch types). The model was used to estimate bobwhite habitat suitability on a scale of 0-1 relative to landscapes in which populations exhibited greater abundance. To evaluate habitat suitability over the Southeastern Coastal Plain Bird Conservation Region, the model was applied to the entire region to generate a surface of habitat suitability with a 5000 m grid cell size. Habitat suitability was projected at six levels: 1) 0.00-0.49; 2) 0.50-0.74; 3) 0.75-0.84; 4) 0.85-0.89; 5) 0.90-0.94; and 6) 0.95-1.00.

The large-scale northern bobwhite habitat suitability model suggested several areas within the
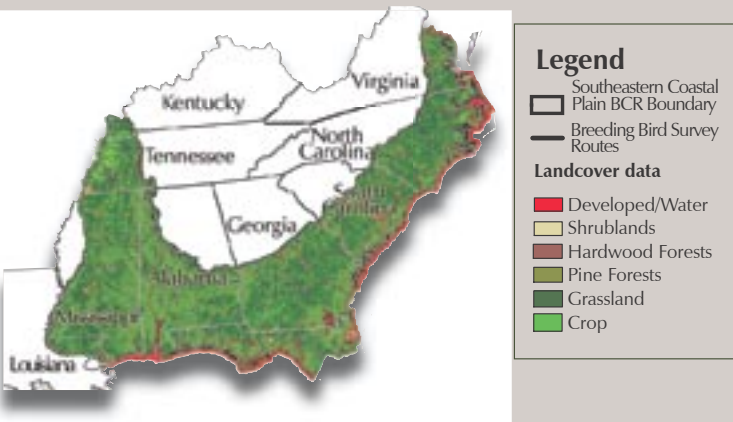
Figure 1
Breeding Bird Survey routes and land cover data used to develop a bobwhite habitat suitability model for the Southeastern Coastal Plain region.
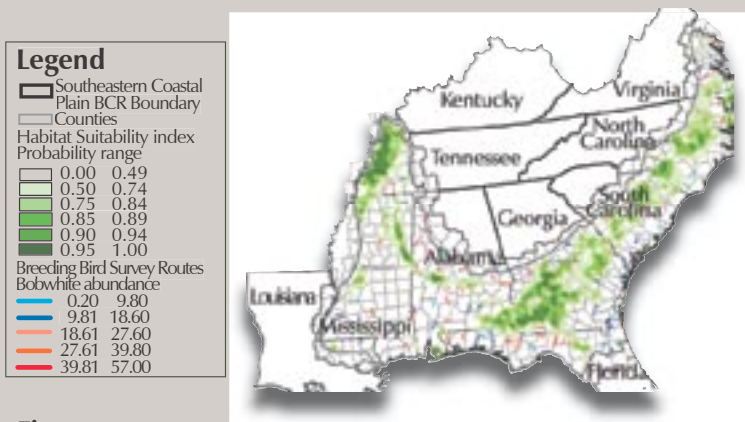

Figure 2
Breeding Bird Survey routes, scaled by bobwhite counts, in relation to predicted habitat suitability for the Southeastern Coastal Plain region.

Southeastern Coastal Plain Bird Conservation Region as having a high probability of supporting moderate bobwhite populations. These areas would likely be most practical for application of habitat/population restoration efforts. There were about 72,713 square miles (39 percent of total area) of habitat patches with a suitability of greater than or equal to 0.50; 37,898 square miles (20 percent of total area) of habitat patches with a suitability of greater than or equal to 0.75; and 6,447 square miles (3 percent of total area) of habitat patches with a suitability of greater than or equal to 0.95.

Model Utilization

The model was not sensitive to pine forest-dominated landscapes due to the nature of the 1992 National Land Cover Data. Open-canopy and closed-canopy pine forests could not be distinguished; an important feature for determining suitability of bobwhite habitat. Future data sets will likely provide a suitable method for modeling bobwhite habitat suitability in forest-dominated landscapes. Despite this shortcoming, this habitat suitability model does provide an objective, data-based approach for assigning management priority areas to agricultural and grassland landscapes within the Southeastern Coastal Plain Bird Conservation Region. Habitat suitability is based on land-use characteristics that have the greatest probability of supporting moderate bobwhite populations. These areas likely represent the greatest opportunity for successful bobwhite population restoration in agricultural/grassland landscapes. The model may also be useful for identifying those areas where the most extensive management will be needed to restore and maintain sustainable bobwhite populations. In order to reach a measurable bobwhite population increase at a regional level, there must be active, large-scale habitat improvements.

Northern Bobwhite Conservation Initiative

In response to the decline in bobwhite quail, the Southeast Quail Study Group Technical Committee developed an ambitious, range-wide population and habitat restoration plan called the Northern Bobwhite Conservation Initiative. The goal of this initiative is to restore range-wide northern bobwhite populations to an average density equivalent to that which existed on improvable acres in the baseline year of 1980.

Southeastern Coastal Plain Region

Bobwhite populations declined at a rate of more than 5½ percent per year from 1980 to 1999 in the Southeastern Coastal Plain Bird Conservation Region. As of 2002, the Northern Bobwhite Conservation Initiative estimated that 859,378 coveys would need to be added to the autumn population to restore bobwhite populations to 1980 levels. In this region, important bobwhite habitat management practices include: 1) conversion of exotic grasses or portions of cropland to native warm season grasses and forbs; 2) restoration of longleaf pine (where applicable); and 3) site preparation, burning, and thinning of pine forests to encourage favorable grasses and forbs.

For information contact:
Wes Burger
662.325.8782
Forest and Wildlife Research Center
Mississippi State University
wburger@cfr.msstate.edu

The **Forest and Wildlife Research Center** at Mississippi State University was established in 1994 to conduct research and technical assistance programs relevant to the efficient management and utilization of the forest, wildlife, and fisheries of the state and region, and the protection and enhancement of the natural environment associated with these resources.

The **Mississippi Department of Wildlife, Fisheries and Parks** was established to conserve and enhance Mississippi's natural resources, to provide continuing outdoor recreational opportunities, to maintain the ecological integrity and aesthetic quality of the resources and to ensure socio-economic and educational opportunities for present and future generations.

Sponsored by the Southeastern Association of Fish and Wildlife Agencies, the Southeastern Section of the Wildlife Society and Quail Unlimited, the **Southeast Quail Study Group** is comprised of over 100 wildlife professionals from state and federal agencies, universities, and private organizations.

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